REMARKS

Reconsideration of the pending application is respectfully requested on the basis of the following particulars.

1. Election

The applicant acknowledges the election of claims 15-21, 23-27, and 29, and the withdrawal from further consideration of claims 31 and 32.

2. In the claims

A. Claim amendments

As shown in the foregoing LIST OF CURRENT CLAIMS, the claims have been amended to more clearly point out the subject matter for which protection is sought.

Claim 15 is amended to recite a one-piece piezo-electric element, the membrane glued to a holder, the shape of the perimeter of the piezo-electric element differs from the shape of the perimeter of the membrane as a result of which the perimeter of the membrane lacks symmetry over 360 degrees in relation to the perimeter of the piezo-electric element, and wherein the membrane does not have a U-shaped diameter. Claim 15 is also amended to remove the recitation of at least first and second grooves. It is respectfully submitted that no new matter is added, since support for the amendments may be found, for example, at least in Figs. 1, 8, 9, 16, 18, and 19 of the pending application and at least on page 3, lines 9-10, and page 7, lines 24-30, of the accompanying description in the specification as originally filed, and in claim 27 as previously presented.

Claim 27 is amended to be consistent with amended claim 1 and to recite that the holder is formed of a wall of a housing device. It is respectfully submitted that no new matter is added, since support for the amendments may be found, for example, at least in Figs. 8 and 9 of the pending application and at least on page 6, line 30 through page 7, line 15 of the accompanying description in the specification as originally filed

Claims 16-21, 23-26, 29, 31, and 32 are left unchanged.

Claims 1-14, 22, 28, and 30 remain canceled.

Entry of the LIST OF CURRENT CLAIMS is respectfully requested in the next Office communication.

B. Discussion of claims in view of the elected embodiment

The embodiment elected in the reply filed October 7, 2008 included at least first and second grooves provided in the membrane. While this feature has been removed from amended claim 15, as discussed above, amended claim 15 is generic to the elected embodiment, since amended claim 15 does not preclude the structure of first and second grooves provided in the membrane.

3. Rejection of claims 15-21, 23-27, and 29 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent no. 6,169,809 (*Azima et al.*) (the *'809* patent) in view of U.S. patent no. 6,985,596 (*Bank et al.*)

Reconsideration of this rejection is respectfully requested on the basis that the rejection fails to establish a *prima facie* case of obviousness with respect to amended claim 15, from which claims 16-21, 23-27, and 29 depend.

By way of review, the embodiment of amended claim 15 requires a piezo-electric transducer for reproducing or recording sound, comprising a membrane onto which is provided a one-piece piezo-electric element, the membrane composed of a plurality of layers of which at least one layer is made of a polymer. The piezo-electric element has two radial surfaces, an entirety of one of the radial surfaces being directly glued onto the membrane and the membrane is glued to a holder. The shape of the perimeter of the piezo-electric element differs from the shape of the perimeter of the membrane as a result of which the perimeter of the membrane lacks symmetry over 360 degrees in relation to the perimeter of the piezo-electric element. Further, the membrane does not have a U-shaped diameter.

Neither the *'809* nor the *Bank* patents disclose a transducer for reproducing sound, including a one-piece piezo-electric element having two radial surfaces wherein an entirety of one radial surface is directly glued onto a membrane composed of a plurality of layers, of which at least one layer is made of a polymer, wherein the membrane is glued to a holder, and wherein the shape of the perimeter of the piezo-electric element differs from the shape of the perimeter of the membrane as a result of which the perimeter of the membrane lacks symmetry over 360 degrees in relation to the perimeter of the piezo-electric element, as required by amended claim 15.

With respect to the *'809* patent, the deficiencies of which were addressed in the response filed June 12, 2007 and are reiterated herein, a loudspeaker 81 is disclosed that includes a transducer 9 mounted on a panel 2. In viewing Figs. 1 and 3 of the *'809* patent, the transducer is apparently a circular disk shaped transducer. The Office action, on page 2, refers to the transducer 9 as a "generally circular piezoelectric element (9)."

The transducer of the *'809* patent, however, is not a piezo-electric transducer. Instead, the transducer 9 is disclosed as being of the type disclosed in co-pending patent application serial nos. 09/011,773, and 09/011,831, which issued respectively as U.S. patent nos. 6,192,136, (the *'136* patent) and 6,151,402 (the *'402* patent), both to *Azima et al.* (the *'809* patent, col. 2, lines 46-50).

Looking to the *'136* and the *'402* patents, an inertial vibration transducer 9 is disclosed. As can be seen from the figures and the disclosures of the *'136* and the *'402* patents, an inertial vibration transducer includes a coil 13, a pair of opposed magnets 15, and a pole forming member 14. Thus, the transducers of the *'809*,*'136*, and the *'402* patents are all electromotive arrangements that require a complex structure of coils, poles, and magnets in order to provide a motion in response to electricity passing through the coils.

Such inertial vibration transducers are not piezo-electric elements, as asserted by the Office action, since a piezo-electric element does not require a complex arrangement of coils, poles, and magnets in order to provide a motion in response to voltage, but instead, the material of the piezo-electric element itself changes in dimension in response to an externally applied voltage.

Furthermore, such electro-motive transducers operate differently from transducers based upon piezo-electricity, like the embodiment of claim 15, and the problems associated with the different transducers are also different.

For example, a well known problem of piezo-electric transducers, for which the embodiment of claim 15 provides a solution, is the distortion of sound. In particular, the distortion of sound in the low frequency range of the audible spectrum from 15 Hz to 5 kHz. The embodiment of claim 15 provides a transducer that improves sound quality, specifically in the low frequency range, by flattening the frequency response and reducing harmonic distortions. The reduced harmonic distortions are a result of the asymmetric perimeter of the piezo-electric element/membrane combination, and the gluing of the membrane.

In contrast, the typical problem of electro-motive transducers which the *'809* patent attempts to resolve, is to improve the coupling of the energy towards the vibrating panel (the *'809* patent, col. 3, lines 38-43; col. 5, lines 27-31, 45-50). According to the *'809* patent, this is realized through preferential positioning of the electromagnetic excitation element 9 on the panel 2 in order to vibrate the panel to resonate (see for instance Fig. 1 and 3 of the *'809* patent).

Even though Fig. 3 of the *'809* patent may disclose a vibrating panel 2 that is not round and is positioned asymmetrically with respect to a circular electromagnetic transducer 9, the disclosed transducer is not a piezo-electric transducer as required by amended claim 15. Further, a skilled artisan would not have utilized the same geometry between a non-circular panel and a circular piezo-electric transducer, since it is not necessary to better couple the energy towards the membrane, and there is no suggestion that this geometry, when applied to piezo-electric transducers, would result in reduced harmonics. The apparent correspondence of the geometry of the electro-motive transducer/panel combination of the *'809* patent and the embodiment according to amended claim 15 is purely coincidental, and a skilled artisan would not have looked to such a configuration to improve sound quality, specifically in the low frequency range, by flattening the frequency response and reducing harmonic distortions, as is accomplished by the embodiment of amended claim 15.

Additionally, as acknowledged in the Office action on page 3, the *'809* patent fails to disclose how the transducer 9 is attached to the panel 2.

Thus, the *'809* patent fails to disclose a one-piece piezo-electric element having two radial surfaces wherein an entirety of one radial surface is directly glued onto a membrane composed of a plurality of layers, as required by amended claim 15.

The Office action relies on the *Bank* patent to provide for the deficiencies of the *'809* patent (Office action, page 3). However, the *Bank* patent also fails to disclose a transducer for reproducing sound, including a one-piece piezo-electric element having two radial surfaces wherein an entirety of one radial surface is directly glued onto a membrane composed of a plurality of layers, of which at least one layer is made of a polymer, wherein the membrane is glued to a holder, and wherein the shape of the perimeter of the piezo-electric element differs from the shape of the perimeter of the membrane as a result of which the perimeter of the membrane lacks symmetry over 360 degrees in relation to the perimeter of the piezo-electric element, as required by amended claim 15.

The *Bank* patent discloses numerous embodiments of loudspeakers wherein the exciter (electro-dynamic or piezo-electric) is used to apply a bending couple to the vibrating panel to reduce specific excitation modes (col. 2, lines 1-23). Only the embodiments shown in Figs. 5, 6, 13-16, and 22-26 disclose the use of piezo-electric elements, and thus these embodiments are the only relevant disclosure in the *Bank* patent. As discussed below, all of these embodiments differ essentially from the piezo-electric transducer as defined in amended claim 15.

Specifically, the embodiments of Figs. 5 and 6 disclose a rectangular single layer membrane having a rectangular piezo element thereon. This configuration is in contrast to the embodiment of amended claim 15, which requires a membrane having a plurality of layers and the shape of the perimeter of the piezo-electric element to differ from the shape of the perimeter of the membrane as a result of which the perimeter of the membrane lacks symmetry over 360 degrees in relation to the perimeter of the piezo-electric element.

With regard to the embodiments in Figs. 13, and 22-26, a torsional piezo element is disclosed that is not glued onto the membrane, as required by amended claim 15.

Turning to the embodiments of Figs. 14-16, rectangular piezo elements are disclosed as being symmetrically positioned on a rectangular membrane. This configuration is in contrast to the embodiment of amended claim 15, which requires the shape of the perimeter of the piezo-electric element to differ from the shape of the perimeter of the membrane as a result of which the perimeter of the membrane lacks symmetry over 360 degrees in relation to the perimeter of the piezo-electric element.

Summarizing, the *Bank* patent fails to disclose every feature of amended claim 15. Furthermore, the *Bank* patent does not discuss the problem of improving the low end frequency response and reducing harmonic distortion for piezo transducer based loudspeakers. Since no mention is made of these problems, the *Bank* patent further clearly does not teach or suggest mitigating these problems by gluing a one-piece piezo-electric element asymmetrically onto a non-circular shaped multi-layer polymer membrane, as required by amended claim 15.

In view of the above discussion, it is not clear what would have caused a skilled artisan to combine the features of the *'809* and the *Bank* patents to cope with the problem of improving sound quality by reducing harmonic distortions that is specific to piezo-electric transducers and is not mentioned or addressed in either the *'809* nor the *Bank* patents.

Since neither the *'809* nor the *Bank* patents disclose a transducer for reproducing sound, including a one-piece piezo-electric element having two radial surfaces wherein an entirety of one radial surface is directly glued onto a membrane composed of a plurality of layers, of which at least one layer is made of a polymer, wherein the membrane is glued to a holder, and wherein the shape of the perimeter of the piezo-electric element differs from the shape of the perimeter of the membrane as a result of which the perimeter of the membrane lacks symmetry over 360 degrees in relation to the perimeter of the piezo-electric element, as required by amended claim 15, the proposed combination of the *'809* and the *Bank* patents must also fail to disclose these features. Further, there are no teachings that would have suggested the proposed combination to a skilled artisan.

Accordingly, since neither the *'809* nor the *Bank* patents disclose every feature of amended claim 15, and a skilled artisan would not have combined the teachings of the *'809* and the *Bank* patents, a *prima facie* case of obviousness cannot be established with respect to amended claim 15, from which the remaining claims depend, and withdrawal of this rejection is respectfully requested.

4. Discussion of other patents

It is respectfully submitted that amended claim 15, from which the remaining claims depend, defines subject matter that is patentable in view of either U.S. patent no. 6,332,029 (*Azima et al.*) or U.S. publication no. 2002/0041694 (*Michiels*).

With respect to the *Azima* patent, piezo-electric transducers for buzzer applications are disclosed. This concerns the use of a membrane and piezo-electric exciter for a completely different application wherein the membrane has to sustain resonance at specific frequencies (col. 20, line 61 through col. 21, line 6) and wherein a flat frequency characteristic over a broad range of frequencies is not an objective.

In contrast, in the embodiment of amended claim 15, resonance is suppressed and avoided by gluing the membrane to a holder along its perimeter, and the frequency characteristic is further flattened through the asymmetric perimeters of piezo-electric element and the membrane.

Thus, the acoustic device of the *Azima* patent does not function in the same manner as the embodiment of amended claim 15 and is thus not suitable for reproducing or recording sound, as is required by the embodiment of amended claim 15.

Turning to the *Michiels* publication, a transducer is disclosed having a one-piece piezo-ceramic disk 2 and a membrane 3 (abstract). The embodiments of the *Michiels* publication are designed to improve the frequency characteristic. In contrast, the embodiment of amended claim 15 not only improves the frequency characteristic, but also is advantageous in terms of total harmonic distortion.

In the embodiments shown in Figs. 22, 29, 33, 38, 41, and 42, the membrane 3 is disclosed as having only a single layer.

While the embodiment of Fig. 44 does disclose a membrane 3 that can be coated with a layer of metal 14, the membrane 3 of the embodiment of Fig. 44 has a U-shaped diameter, which membrane would consequently be thicker and less suitable for applications that require thin transducers such as portable audio devices.

This configuration is also in contrast to amended claim 15, which requires that the membrane not have a U-shaped diameter.

Thus, in view of the above discussion, it is respectfully submitted that amended claim 15, from which the remaining claims depend, defines subject matter that is patentable in view of either U.S. patent no. 6,332,029 (*Azima et al.*) or U.S. publication no. 2002/0041694 (*Michiels*).

5. Conclusion

As a result of the amendment to the claims, and further in view of the foregoing remarks, it is respectfully submitted that the application is in condition for allowance. Accordingly, it is respectfully requested that every pending claim in the present application be allowed and the application be passed to issue.

Please charge any additional fees required or credit any overpayments in connection with this paper to Deposit Account No. 02-0200.

If any issues remain that may be resolved by a telephone or facsimile communication with the applicant's attorney, the examiner is invited to contact the undersigned at the numbers shown below.

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